

CLAIMS

1. A non-aqueous electrolyte secondary battery comprising:

a positive electrode comprising a positive electrode substrate and a positive electrode material mixture layer carried on said positive electrode substrate;

a negative electrode comprising a negative electrode substrate and a negative electrode material mixture layer carried on said negative electrode substrate;

a separator or lithium-ion conductive porous film interposed between said positive electrode and said negative electrode; and

a lithium-ion conductive non-aqueous electrolyte,

wherein said positive electrode material mixture layer comprises a positive electrode active material comprising a lithium transition metal composite oxide, said lithium transition metal composite oxide comprising lithium, a transition metal, and a metal different from said transition metal,

said negative electrode material mixture layer comprises a negative electrode active material comprising a carbon material that is capable of absorbing and desorbing lithium,

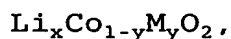
the end of charge voltage of said non-aqueous electrolyte secondary battery is set to 4.25 to 4.5 V in

normal operation, and

the ratio $R:W_p/W_n$ is 1.3 to 2.2 in the area where said positive electrode material mixture layer and said negative electrode material mixture layer are opposed to each other, said W_p being the weight of the positive electrode active material contained in said positive electrode material mixture layer per unit opposed area, said W_n being the weight of the negative electrode active material contained in said negative electrode material mixture layer per unit opposed area.

2. The non-aqueous electrolyte secondary battery in accordance with claim 1,

wherein said lithium transition metal composite oxide is represented by the general formula (1):



said general formula (1) satisfies $1.0 \leq x \leq 1.03$ and $0.005 \leq y \leq 0.15$,

the element M in said general formula (1) is at least one selected from the group consisting of Mg, Al, Ti, Sr, Mn, Ni and Ca, and

said ratio R is 1.5 to 2.2.

3. The non-aqueous electrolyte secondary battery in accordance with claim 1,

wherein said lithium transition metal composite oxide is represented by the general formula (2):



said general formula (2) satisfies $1.0 \leq x \leq 1.03$, $0.3 \leq y \leq 0.5$, $0.3 \leq z \leq 0.5$, and $0.9 \leq y/z \leq 1.1$,

the element M in said general formula (2) is at least one selected from the group consisting of Co, Mg, Al, Ti, Sr and Ca, and

said ratio R is 1.3 to 2.0.

4. The non-aqueous electrolyte secondary battery in accordance with claim 1,

wherein said lithium transition metal composite oxide comprises a composite oxide A and a composite oxide B,

said composite oxide A is represented by the general formula (1): $\text{Li}_x\text{Co}_{1-y}\text{M}_y\text{O}_2$,

said general formula (1) satisfies $1.0 \leq x \leq 1.03$, and $0.005 \leq y \leq 0.15$,

the element M in said general formula (1) is at least one selected from the group consisting of Mg, Al, Ti, Sr, Mn, Ni and Ca,

said composite oxide B is represented by the general formula (2): $\text{Li}_x\text{Ni}_y\text{Mn}_z\text{M}_{1-y-z}\text{O}_2$,

said general formula (2) satisfies $1.0 \leq x \leq 1.03$, $0.3 \leq y \leq 0.5$, $0.3 \leq z \leq 0.5$, and $0.9 \leq y/z \leq 1.1$,

the element M in said general formula (2) is at least one selected from the group consisting of Co, Mg, Al, Ti, Sr and Ca, and

said ratio R is 1.3 to 2.2.

5. The non-aqueous electrolyte secondary battery

in accordance with claim 4, wherein the weight ratio between said composite oxide A and said composite oxide B is 9:1 to 1:9.

6. The non-aqueous electrolyte secondary battery in accordance with claim 1,

wherein said positive electrode material mixture layer contains a metal oxide represented by the general formula (3): MO_x ,

said general formula (3) satisfies $0.4 \leq x \leq 2.0$,
and

the element M in said general formula (3) is at least one selected from the group consisting of Li, Co, Mg, Al, Ti, Sr, Mn, Ni and Ca.

7. A charge and discharge system for a non-aqueous electrolyte secondary battery, comprising the non-aqueous electrolyte secondary battery as recited in claim 1 and a charger for said non-aqueous electrolyte secondary battery, wherein said charger is set such that it stops charging when the voltage of said secondary battery reaches 4.25 to 4.5 V.